Scientific Inquiry

4-1 The student will demonstrate an understanding of scientific inquiry, including the processes, skills, and mathematical thinking necessary to conduct a simple scientific investigation.

4-1.1 Classify observations as either quantitative or qualitative.
Taxonomy Level: 2.3-B Understand Conceptual Knowledge

Previous/Future knowledge: In kindergarten (K-1.4), students identified observed objects or events using the senses. In 1st grade (1-1.1), students compared, classified, and sequenced objects by number, shape, texture, size, color, and motion, using Standard English units of measurement where appropriate. In 3rd grade, students classified objects by two of their properties (3-1.1) and classified objects or events in sequential order (3-1.2). They will use this skill throughout the remainder of their science instruction.

It is essential for students to know that making *observations* is a way of learning about the world around us. A *scientific observation* is one that anyone can make and the result will always be the same if made under identical conditions. Scientific observations are made by using the senses or taking measurements. Making *observations* is a way of learning about the world around us.

- A *scientific observation* is one that anyone can make and the result will always be the same. For example, the animal is black, has four legs, and feels soft.
- An *unscientific observation*, or an opinion, is one that not everyone may agree on. For example, the dog is happy.
- Observing does not mean just looking at something. It involves the use of several or all of the five senses (seeing, hearing, smelling, touching, and tasting) using appropriate observation methods for each sense, such as wafting an odor so that its smell can be described or gently touching the edges of seashells to determine their textures.
- Tasting in science should only be done with the permission of the teacher under controlled conditions.
- Observing helps to find out about objects (their characteristics, properties, differences, similarities) and events (what comes first or last, or what is happening at a particular moment).

Observations can be classified as quantitative or qualitative.

Quantitative observations are

- Observations that use numbers (amounts) or measurements (including the unit label).
- Observations that make relative comparisons, such as more than, all, less than, few, or none.
- Specific pieces of information that communicate to others and serve as a basis for comparison.

Qualitative observations are

- Observations that are made using only the senses and refer to specific attributes.
- Communicated as words, pictures, or diagrams.

Assessment Guidelines:
The objective of this indicator is to *classify* observations as either quantitative or qualitative; therefore, the primary focus of assessment should be to determine if an observation is qualitative or quantitative based on a given description. However, appropriate assessments should also require students to *recognize* a quantitative or qualitative observation; *compare* quantitative and qualitative observations; *recall* that quantitative measurements must have a unit label; *exemplify* quantitative or qualitative observations; or *summarize* the difference between a qualitative and a quantitative observation.